

## **AMENDMENTS TO THE CLAIMS**

### **Claims 1-27 (Cancelled)**

**Claim 28 (Currently Amended)** A manifold system for separate distribution of two fluids, the manifold system comprising:

a multi-channel monolithic structure including outer structure walls and inner channel walls defining channel openings of a plurality of channels of said multi-channel monolithic structure, said channel openings of said plurality of channels being spread over an entire cross-sectional area of said multi-channel monolithic structure, and said plurality of channels sharing at least a portion of said inner channel walls; and

a manifold head including a first tunnel and a second entry/exit point distributing the two fluids separately into and out of said plurality of channels to effect mass and/or heat transfer between the two fluids,

wherein said first tunnel of said manifold head includes a first tunnel wall having through slots communicating with one or more first gaps of said manifold head,

wherein said second entry/exit point of said manifold head includes a second wall having through slots communicating with one or more second gaps of said manifold head,~~and~~

wherein each fluid of the two fluids is fed separately through said manifold head, such that (i) a first fluid of the two fluids is fed through said first tunnel and said through slots communicating with said one or more first gaps to distribute the first fluid into specific channels of said plurality of channels of said multi-channel monolithic structure, (ii) a second fluid of the two fluids is fed through said second entry/exit point and said through slots communicating with said one or more second gaps to distribute the second fluid into specific channels of said plurality

of channels of said multi-channel monolithic structure, and (iii) at least one of said inner channel walls is common between the first fluid and the second fluid as the first fluid and the second fluid are respectively fed through said first tunnel and said second entry/exit point, and wherein said manifold head distributes the first fluid and the second fluid into the specific channels of said multi-channel monolithic structure in a checkerboard configuration, such that, when one of the first fluid and the second fluid is distributed into a first channel of the specific channels, another one of the first fluid and the second fluid is distributed into all channels, of the specific channels, which are adjacent to the first channel of the specific channels.

**Claim 29 (Previously Presented)** The manifold system according to claim 28, wherein said manifold head comprises:

three parallel dividing plates joined together by spacers, such that the spacers form gaps with slots between said three parallel dividing plates; and

end cover plates joined in parallel to said three parallel dividing plates,

wherein each of said three parallel dividing plates and each of said end cover plates includes an inner opening, such that the inner openings of said three parallel dividing plates and said end cover plates form said first tunnel of said manifold head extending through said three parallel dividing plates, and

wherein said first tunnel wall includes slots communicating with said one or more first gaps of said manifold head, such that the first fluid enters said one or more first gaps.

**Claim 30 (Cancelled)**

**Claim 31 (Previously Presented)** The manifold system according to claim 28, wherein said manifold head is sealed to at least one face of said multi-channel monolithic structure where said channel openings are located, and

wherein at least one hole plate having a plurality of holes is sealed between said manifold head and said at least one face of said multi-channel monolithic structure.

**Claim 32 (Previously Presented)** The manifold system according to claim 31, wherein said holes of said at least one hole plate are positioned such that the two fluids flow from said plurality of channels of said multi-channel monolithic structure to said one or more first gaps and said one or more second gaps of said manifold head and vice versa.

**Claim 33 (Previously Presented)** The manifold system according to claim 28, wherein one or more of said inner channel walls are coated with one or more catalytic active components.

**Claim 34 (Previously Presented)** The manifold system according to claim 28, wherein said channel openings of said plurality of channels are evenly distributed over the entire cross-sectional area of said multi-channel monolithic structure in a chessboard pattern.

**Claim 35 (Previously Presented)** The manifold system according to claim 28, wherein said inner channel walls of said multi-channel monolithic structure are oriented at a 45 degree angle with respect to said outer structure walls.

**Claim 36 (Previously Presented)** The manifold system according to claim 29, wherein said three parallel dividing plates are sealed to a hole plate having a plurality of holes.

**Claim 37 (Previously Presented)** The manifold system according to claim 29, wherein said three parallel dividing plates are sealed directly to said inner channel walls of said multi-channel monolithic structure.

**Claim 38 (Previously Presented)** The manifold system according to claim 28, wherein said manifold head is sealed to at least one face of said multi-channel monolithic structure where the said channel openings are located.

**Claim 39 (Currently Amended)** A manifold stack comprising:

~~said manifold head according to claim 28; and~~

a manifold head including a first tunnel and a second entry/exit point distributing the two fluids separately into and out of said plurality of channels to effect mass and/or heat transfer between the two fluids;

a first multi-channel monolithic structure including outer structure walls and inner channel walls defining channel openings of a plurality of channels of said first multi-channel monolithic structure, said channel openings of said plurality of channels being spread over an entire cross-sectional area of said first multi-channel monolithic structure, and said plurality of channels sharing at least a portion of said inner channel walls; and

a second ~~two of said~~ multi-channel monolithic structure-structures according to claim 28 including outer structure walls and inner channel walls defining channel openings of a plurality

of channels of said second multi-channel monolithic structure, said channel openings of said plurality of channels of said second multi-channel monolithic structure being spread over an entire cross-sectional area of said second multi-channel monolithic structure, and said plurality of channels of said second multi-channel monolithic structure sharing at least a portion of said inner channel walls of said second multi-channel monolithic structure.

~~wherein said channel openings of said two multi-channel monolithic structures are spread over the entire cross-sectional area of each respective multi-channel monolithic structure of said two multi-channel monolithic structures and said plurality of channels of each respective multi-channel monolithic structure of said two multi-channel monolithic structures share at least a portion of said inner channel walls;~~

wherein said first tunnel of said manifold head includes a first tunnel wall having through slots communicating with one or more first gaps of said manifold head,

wherein said second entry/exit point of said manifold head includes a second wall having through slots communicating with one or more second gaps of said manifold head,

~~wherein said manifold head is sealed to at least one face of said first multi-channel monolithic structure, of said two multi-channel monolithic structures, where said channel openings are located,~~

~~wherein at least one plate with holes is sealed between said manifold head and said at least one face of said first one multi-channel monolithic structure of said two multi-channel monolithic structures,~~

wherein each fluid of the two fluids is fed separately through said manifold head, such that (i) a first fluid of the two fluids is fed through said first tunnel and said through slots communicating with said one or more first gaps to distribute the first fluid into specific channels

of said plurality of channels of said first multi-channel monolithic structure, (ii) a second fluid of the two fluids is fed through said second entry/exit point and said through slots communicating with said one or more second gaps to distribute the second fluid into specific channels of said plurality of channels of said first multi-channel monolithic structure, and (iii) at least one of said inner channel walls of said first multi-channel monolithic structure is common between the first fluid and the second fluid as the first fluid and the second fluid are respectively fed through said first tunnel and said second entry/exit point,

wherein said manifold head distributes the first fluid and the second fluid into the specific channels of said first multi-channel monolithic structure in a checkerboard configuration, such that, when one of the first fluid and the second fluid is distributed into a first channel of the specific channels of said first multi-channel monolithic structure, another one of the first fluid and the second fluid is distributed into all channels, of the specific channels of said first multi-channel monolithic structure, which are adjacent to the first channel of the specific channels of said first multi-channel monolithic structure, and

wherein said manifold stack includes at least one connector plate or another coupling device connecting said manifold head and/or ~~one said first~~ multi-channel monolithic structure ~~of said two multi-channel monolithic structures~~ to a neighboring manifold head or said second multi-channel monolithic structure ~~structures~~.

**Claim 40 (Cancelled)**

**Claim 41 (Currently Amended)**    A row of manifold systems, said row comprising: ~~including a plurality of said manifold systems according to claim 29~~

a first manifold system; and

a second manifold system,

wherein each of said first manifold system and said second manifold system respectively includes:

\_\_\_\_\_ a multi-channel monolithic structure including outer structure walls and inner channel walls defining channel openings of a plurality of channels of said multi-channel monolithic structure, said channel openings of said plurality of channels being spread over an entire cross-sectional area of said multi-channel monolithic structure, and said plurality of channels sharing at least a portion of said inner channel walls; and

a manifold head including a first tunnel and a second entry/exit point distributing the two fluids separately into and out of said plurality of channels to effect mass and/or heat transfer between the two fluids,

wherein said first tunnel of said respective manifold head, of each respective manifold system of said first and second manifold systems, includes a first tunnel wall having through slots communicating with one or more first gaps of said respective manifold head,

wherein said second entry/exit point of said respective manifold head, of each respective manifold system of said first and second manifold systems, includes a second wall having through slots communicating with one or more second gaps of said respective manifold head,

wherein each fluid of the two fluids is fed separately through said respective manifold head, of each respective manifold system of said first and second manifold systems, such that (i) a first fluid of the two fluids is fed through said first tunnel and said through slots communicating with said one or more first gaps to distribute the first fluid into specific channels of said plurality of channels of said respective multi-channel monolithic structure, (ii) a second

fluid of the two fluids is fed through said second entry/exit point and said through slots communicating with said one or more second gaps to distribute the second fluid into specific channels of said plurality of channels of said respective multi-channel monolithic structure, and (iii) at least one of said inner channel walls is common between the first fluid and the second fluid as the first fluid and the second fluid are respectively fed through said first tunnel and said second entry/exit point of said respective manifold head,

wherein said respective manifold head, of each respective manifold system of said first and second manifold systems, distributes the first fluid and the second fluid into the specific channels of said respective multi-channel monolithic structure in a checkerboard configuration, such that, when one of the first fluid and the second fluid is distributed into a first channel of the specific channels, another one of the first fluid and the second fluid is distributed into all channels, of the specific channels, which are adjacent to the first channel of the specific channels, and

wherein a sealing ring and two different types (type A and B) of end covers of said manifold head of said first manifold system connect said manifold head of said first one manifold system of said plurality of manifold systems with said manifold head of said second manifold system a neighboring manifold system of said plurality of manifold systems.

**Claim 42 (Currently Amended)** A block comprising: ~~a plurality of said rows of said plurality of manifold systems according to claim 41,~~

a first row; and

a second row,



wherein said first row and said second row are each row of said plurality of rows being stapled face to face, and

wherein each respective row, of said first row and said second row includes:

a first manifold system; and

a second manifold system,

wherein each of said first manifold system and said second manifold system respectively includes:

a multi-channel monolithic structure including outer structure walls and inner channel walls defining channel openings of a plurality of channels of said multi-channel monolithic structure, said channel openings of said plurality of channels being spread over an entire cross-sectional area of said multi-channel monolithic structure, and said plurality of channels sharing at least a portion of said inner channel walls; and

a manifold head including a first tunnel and a second entry/exit point distributing the two fluids separately into and out of said plurality of channels to effect mass and/or heat transfer between the two fluids,

wherein said first tunnel of said respective manifold head, of each respective manifold system of said first and second manifold systems, includes a first tunnel wall having through slots communicating with one or more first gaps of said respective manifold head,

wherein said second entry/exit point of said respective manifold head, of each respective manifold system of said first and second manifold systems, includes a second wall having through slots communicating with one or more second gaps of said respective manifold head,

wherein each fluid of the two fluids is fed separately through said respective manifold head, of each respective manifold system of said first and second manifold systems, such that (i) a first fluid of the two fluids is fed through said first tunnel and said through slots communicating with said one or more first gaps to distribute the first fluid into specific channels of said plurality of channels of said respective multi-channel monolithic structure, (ii) a second fluid of the two fluids is fed through said second entry/exit point and said through slots communicating with said one or more second gaps to distribute the second fluid into specific channels of said plurality of channels of said respective multi-channel monolithic structure, and (iii) at least one of said inner channel walls is common between the first fluid and the second fluid as the first fluid and the second fluid are respectively fed through said first tunnel and said second entry/exit point of said respective manifold head.

wherein said respective manifold head, of each respective manifold system of said first and second manifold systems, distributes the first fluid and the second fluid into the specific channels of said respective multi-channel monolithic structure in a checkerboard configurat, such that, when one of the first fluid and the second fluid is distributed into a first channel of the specific channels, another one of the first fluid and the second fluid is distributed into all channels, of the specific channels, which are adjacent to the first channel of the specific channels, and

wherein a sealing ring and two different types (type A and B) of end covers of said manifold head of said first manifold system connect said manifold head of said first manifold system with said manifold head of said second manifold system.

**Claim 43 (Currently Amended)** A reactor for mass and/or heat transfer between the two fluids, said reactor comprising: ~~one or more of said manifold systems according to claim 28~~

a manifold system for separate distribution of the two fluids, said manifold system including:

a multi-channel monolithic structure including outer structure walls and inner channel walls defining channel openings of a plurality of channels of said multi-channel monolithic structure, said channel openings of said plurality of channels being spread over an entire cross-sectional area of said multi-channel monolithic structure, and said plurality of channels sharing at least a portion of said inner channel walls; and

a manifold head including a first tunnel and a second entry/exit point distributing the two fluids separately into and out of said plurality of channels to effect mass and/or heat transfer between the two fluids,

wherein said first tunnel of said manifold head includes a first tunnel wall having through slots communicating with one or more first gaps of said manifold head,

wherein said second entry/exit point of said manifold head includes a second wall having through slots communicating with one or more second gaps of said manifold head,

wherein each fluid of the two fluids is fed separately through said manifold head, such that (i) a first fluid of the two fluids is fed through said first tunnel and said through slots communicating with said one or more first gaps to distribute the first fluid into specific channels of said plurality of channels of said multi-channel monolithic structure, (ii) a second fluid of the two fluids is fed through said second entry/exit point and said through slots communicating with said one or more second gaps to distribute the second fluid into specific channels of said plurality of channels of said multi-channel monolithic structure, and (iii) at least one of said inner channel

walls is common between the first fluid and the second fluid as the first fluid and the second fluid are respectively fed through said first tunnel and said second entry/exit point, and wherein said manifold head distributes the first fluid and the second fluid into the specific channels of said multi-channel monolithic structure in a checkerboard configuration, such that, when one of the first fluid and the second fluid is distributed into a first channel of the specific channels, another one of the first fluid and the second fluid is distributed into all channels, of the specific channels, which are adjacent to the first channel of the specific channels.

**Claim 44 (Currently Amended)**    A method for mass and/or heat transfer between the two fluids of a manifold system including (i) a multi-channel monolithic structure including outer structure walls and inner channel walls defining channel openings of a plurality of channels of the multi-channel monolithic structure, the channel openings of the plurality of channels being spread over an entire cross-sectional area of the multi-channel monolithic structure, and the plurality of channels sharing at least a portion of the inner channel walls, and (ii) a manifold head including a first tunnel and a second entry/exit point distributing the two fluids separately into and out of the plurality of channels to effect mass and/or heat transfer between the two fluids, wherein the first tunnel of the manifold head includes a first tunnel wall having through slots communicating with one or more first gaps of the manifold head, wherein the second entry/exit point of the manifold head includes a second wall having through slots communicating with one or more second gaps of the manifold head, wherein each fluid of the two fluids is fed separately through the manifold head, such that (i) a first fluid of the two fluids is fed through the first tunnel and the through slots communicating with the one or more first gaps to distribute the first fluid into specific channels of the plurality of channels of the multi-channel monolithic structure,

(ii) a second fluid of the two fluids is fed through the second entry/exit point and the through slots communicating with the one or more second gaps to distribute the second fluid into specific channels of the plurality of channels of the multi-channel monolithic structure, and (iii) at least one of the inner channel walls is common between the first fluid and the second fluid as the first fluid and the second fluid are respectively fed through the first tunnel and the second entry/exit point, and wherein the manifold head distributes the first fluid and the second fluid into the specific channels of the multi-channel monolithic structure in a checkerboard manner, such that, when one of the first fluid and the second fluid is distributed into a first channel of the specific channels, another one of the first fluid and the second fluid is distributed into all channels, of the specific channels, which are adjacent to the first channel of the specific channels, and wherein said method comprises: including

distributing the two fluids through ~~one or more of said the manifold system systems~~ according to claim 28.

**Claim 45 (Currently Amended)** A row of stacks comprising:

a first manifold stack; and

a second manifold stack,

wherein said first manifold stack and said second manifold stack a plurality of said manifold stacks according to claim 39, said plurality of manifold stacks being are coupled together, and

wherein each respective manifold stack of said first manifold stack and said second manifold stack includes:

a manifold head including a first tunnel and a second entry/exit point distributing the two fluids separately into and out of said plurality of channels to effect mass and/or heat transfer between the two fluids;

a first multi-channel monolithic structure including outer structure walls and inner channel walls defining channel openings of a plurality of channels of said first multi-channel monolithic structure, said channel openings of said plurality of channels being spread over an entire cross-sectional area of said first multi-channel monolithic structure, and said plurality of channels sharing at least a portion of said inner channel walls; and

a second multi-channel monolithic structure including outer structure walls and inner channel walls defining channel openings of a plurality of channels of said second multi-channel monolithic structure, said channel openings of said plurality of channels of said second multi-channel monolithic structure being spread over an entire cross-sectional area of said second multi-channel monolithic structure, and said plurality of channels of said second multi-channel monolithic structure sharing at least a portion of said inner channel walls of said multi-channel monolithic structure,

wherein said first tunnel of said manifold head includes a first tunnel wall having through slots communicating with one or more first gaps of said manifold head,

wherein said second entry/exit point of said manifold head includes a second wall having through slots communicating with one or more second gaps of said manifold head,

wherein said manifold head is sealed to at least one face of said first multi-channel monolithic structure, where said channel openings are located,

wherein at least one plate with holes is sealed between said manifold head and said at least one face of said first multi-channel monolithic structure,

wherein each fluid of the two fluids is fed separately through said manifold head, such that (i) a first fluid of the two fluids is fed through said first tunnel and said through slots communicating with said one or more first gaps to distribute the first fluid into specific channels of said plurality of channels of said first multi-channel monolithic structure, (ii) a second fluid of the two fluids is fed through said second entry/exit point and said through slots communicating with said one or more second gaps to distribute the second fluid into specific channels of said plurality of channels of said first multi-channel monolithic structure, and (iii) at least one of said inner channel walls of said first multi-channel monolithic structure is common between the first fluid and the second fluid as the first fluid and the second fluid are respectively fed through said first tunnel and said second entry/exit point,

wherein said manifold head distributes the first fluid and the second fluid into the specific channels of said first multi-channel monolithic structure in a checkerboard configuration, such that, when one of the first fluid and the second fluid is distributed into a first channel of the specific channels of said first multi-channel monolithic structure, another one of the first fluid and the second fluid is distributed into all channels, of the specific channels of said first multi-channel monolithic structure, which are adjacent to the first channel of the specific channels of said first multi-channel monolithic structure, and

wherein said manifold stack includes at least one connector plate or another coupling device connecting said manifold head and/or said first multi-channel monolithic structure to a neighboring manifold head or said second multi-channel monolithic structure.

**Claim 46 (Currently Amended)**     A row of stacks comprising:  
a first manifold stack; and

a second manifold stack,

wherein each respective manifold stack of said first manifold stack and said second manifold stack includes:

a manifold head including a first tunnel and a second entry/exit point distributing the two fluids separately into and out of said plurality of channels to effect mass and/or heat transfer between the two fluids;

a first multi-channel monolithic structure including outer structure walls and inner channel walls defining channel openings of a plurality of channels of said first multi-channel monolithic structure, said channel openings of said plurality of channels being spread over an entire cross-sectional area of said first multi-channel monolithic structure, and said plurality of channels sharing at least a portion of said inner channel walls; and

a second multi-channel monolithic structure including outer structure walls and inner channel walls defining channel openings of a plurality of channels of said second multi-channel monolithic structure, said channel openings of said plurality of channels of said second multi-channel monolithic structure being spread over an entire cross-sectional area of said second multi-channel monolithic structure, and said plurality of channels of said second multi-channel monolithic structure sharing at least a portion of said inner channel walls of said second multi-channel monolithic structure,

wherein said first tunnel of said manifold head includes a first tunnel wall having through slots communicating with one or more first gaps of said manifold head,

wherein said second entry/exit point of said manifold head includes a second wall having through slots communicating with one or more second gaps of said manifold head,



wherein said manifold head is sealed to at least one face of said first multi-channel monolithic structure, where said channel openings are located,

wherein at least one plate with holes is sealed between said manifold head and said at least one face of said first multi-channel monolithic structure,

wherein each fluid of the two fluids is fed separately through said manifold head, such that (i) a first fluid of the two fluids is fed through said first tunnel and said through slots communicating with said one or more first gaps to distribute the first fluid into specific channels of said plurality of channels of said first multi-channel monolithic structure, (ii) a second fluid of the two fluids is fed through said second entry/exit point and said through slots communicating with said one or more second gaps to distribute the second fluid into specific channels of said plurality of channels of said first multi-channel monolithic structure, and (iii) at least one of said inner channel walls of said first multi-channel monolithic structure is common between the first fluid and the second fluid as the first fluid and the second fluid are respectively fed through said first tunnel and said second entry/exit point,

wherein said manifold head distributes the first fluid and the second fluid into the specific channels of said first multi-channel monolithic structure in a checkerboard configuration, such that, when one of the first fluid and the second fluid is distributed into a first channel of the specific channels of said first multi-channel monolithic structure, another one of the first fluid and the second fluid is distributed into all channels, of the specific channels of said first multi-channel monolithic structure, which are adjacent to the first channel of the specific channels of said first multi-channel monolithic structure, and

wherein said manifold stack includes at least one connector plate or another coupling device connecting said manifold head and/or said first multi-channel monolithic structure to a neighboring manifold head or said second multi-channel monolithic structure, and  
wherein a plurality of manifold stacks according to claim 39, wherein a sealing ring and two different types (type A and B) of end covers of said respective manifold head of one manifold stack of said first manifold stack and said second manifold stack connect said  
respective manifold head of the one manifold stack of said first manifold stack and said second  
plurality of manifold stack-stacks with said respective manifold head of another-a neighboring  
manifold stack of said first manifold stack and said second-plurality of manifold stack-stacks.

**Claim 47 (Cancelled)**

**Claim 48 (Previously Presented)** The manifold system according to claim 31, wherein a hole plate or a system of hole plates provides a hole pattern equivalent to a pattern provided by said plurality of channels of said multi-channel monolithic structure.

**Claim 49 (Cancelled)**

**Claim 50 (Cancelled)**